GSynQ MK-IA Antenna

USER'S GUIDE

RS-422 Version

SYNERGY SYSTEMS, LLC
Time proven products and support

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LIMITED WARRANTY

Synergy Systems, LLC warrants ***GSynQ Antenna and Evaluation Kit Components*** against defects in material and workmanship, under normal use and service, for a period of one year from the product's ship date from Synergy Systems.

The Motorola designed ILotus M12M Oncore GPS receiver contained in the GSynQ Sensor is trademarked by SiRF and manufactured by i-Lotus Corp of Singapore. GPS receivers from other manufacturers are available for integration by Synergy on request.

Any returned product must be accompanied by a Material Return Authorization (MRA) number issued by Synergy Systems. After obtaining an MRA number, send the product transportation and insurance prepaid to:

Synergy Systems, LLC
9950 Scripps Lake Drive, Suite 106
San Diego, CA 92131 USA
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GPS PERFORMANCE

The Global Positioning System (GPS) is operated and supported by the U.S. Department of Defense and is made available for civilian use solely at its discretion. The GPS is subject to degradation of position and velocity accuracies by the Department of Defense. Neither Synergy Systems, SiRF or iLotus warrant or control GPS availability or performance.

PRODUCT DESCRIPTION

The ***GSynQ*** Smart Antenna comprises a Synergy Timing3000 GPS antenna, an M12M Timing receiver, an Interface Electronics Board that provides power and RS-422 level translation to the receiver, and a Binder M16-423 12 pin metal shell connector mounted in the base. The Timing3000 antenna housing provides the electronics with an environmentally sealed, UV tolerant package capable of being mounted on top of a building or on an antenna mast, or the best location for full view of the satellites.

The GSynQ Antenna has been designed specifically for high accuracy timing applications requiring long cable runs that are not economically feasible with expensive low-loss cable and/or inline amplifiers. Cable lengths up to 1KM can be achieved with standard 24 AWG shielded twisted pair cable, providing the user a cost effective solution to system installation.

General specifications are detailed below:

PHYSICAL CHARACTERISTICS

Size:	4” D x 3”H *(102mm x 76mm)*
Weight:	14 oz *(0.4 kg)*
Housing:	Cycolac Radome, aluminum base

ELECTRICAL INTERFACE

Antenna Connector:	Binder M16-09-0131-00-12
Mating Connector:	Binder M16-99-5630-15-12
Power:	+9 - 30Vdc, 70 mA Max.

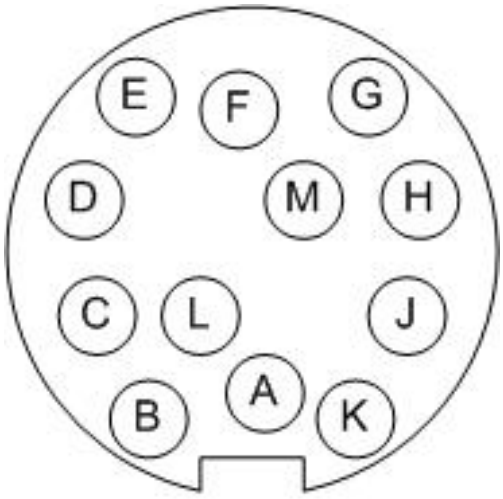
ENVIRONMENTAL CONDITIONS

Operating Temp:	-40^{o}C to +75^{o}C
Storage Temp:	-40^{o}C to +85^{o}C
Relative Humidity:	85% non-condensing,
	-30^{o}C to +60^{o}C

POWER/DATA INTERFACE

The ***GSynQ*** has a 12 pin male Binder M16-423 metal shell connector mounted in the base. Pin outs are detailed below:

Pin A	Power 1
Pin B	Ground 1
Pin C	Ground 2
Pin D	Power 2
Pin E	GPS Data Out - RS422(+)
Pin F	GPS Data Out - RS422(-)
Pin G	Commands In - RS422(-)
Pin H	Commands In - RS422(+)
Pin J	1PPS Out - RS422(+)
Pin K	1PPS Out - RS422(-)
Pin L	Spare
Pin M	Spare



423 Connector
Looking at Front

Straight and Right Angle mating connectors are available from Binder-USA. See Binder Miniature Connectors Series 423-M16 at http://www.binder-usa.com/miniature-cylindrical-connectors/

Voltage input to the antenna may be in the range of +9 to +30 Vdc. For long cable lengths the input voltage must be higher in order to guarantee that at least +9V is available at the pins of the GSynQ connector, not at the voltage source on the supply end. For example, a 12Vdc (unregulated) supply is sufficient to power the antenna through up to approximately 75 meters of a single 24 AWG pair. If longer cable lengths are utilized, both power pairs should be utilized and the power supply

voltage should be increased to allow for the extra IR drop in the cable.

The GSynQ utilizes a high efficiency switching regulator to keep self heating to a minimum (important in high ambient temperature environments.) At +9Vdc input voltage the GSynQ draws approximately 65mA, while at +30Vdc the current draw drops to a little under 20mA.

In the event that the GSynQ is accidentally over-voltaged a self-resetting polymer fuse in the antenna opens, protecting the GSynQ antenna from possible damage. Once tripped, the fuse should be allowed to cool for several minutes before power is reapplied.

OPERATION

Operation of the GSynQ antenna is straight forward. For operational details of the M12M receiver contained in the GSynQ the user is referred to the M12M User's Guide available at www.synergy-gps.com (Tech Support-Users Guides-iLotus).

Basic setup details are as follows:

1 - Connect the antenna to the User System via user cable or Synergy System cable. If the User System does not have an RS422 input then a Synergy Systems Interface Unit can be used for interfacing to RS232 port or USB port.

2 - Apply power.

3 - Send the M12M receiver the desired initialization commands using SiRF Oncore software, SynTAC, or other custom software.

Software— Windows based software to communicate with the GSynQ is available on the Synergy Systems website-www.Synergy-gps.com.

The SiRF Oncore program is a free download that may be accessed from the home page. An evaluation copy of Synergy's *SynTaC* software is available from the *Technical Support* page of the website. Please refer to the ILotus M12M GPS Receiver User's Guide for details on operation of the M12M contained in the GSynQ antenna.

1PPS Offset - Unlike GPS systems with short cabling systems, the interface cable and RS422 drivers can introduce an appreciable offset that should be compensated for. The MAX3488 RS422 driver in the GSynQ antenna has a typical propagation delay of approximately 900nS and twisted pair cables such as those used for the interface cable typically have delays on the order of 170nS per 100 ft (~31m).

Both of these delays can be removed from the 1PPS by using the Motorola binary @@Az command as detailed in the M12M User's Guide.

ANTENNA INSTALLATION

The GSynQ is designed for simple installation.

Mounts include Right Angle pipe clamp, adaptors for threaded or smooth pipe and gasket and nut for through-roof vehicle mount.

When using Synergy's R/A mounting bracket P/N10001725, the mast may be made from 1" schedule 40 pipe, or any tubing or conduit with an outside diameter of 1.5" or less.

In order to mount the antenna on the end of a 3/4" NPT threaded pipe (or 1-14 Marine Thread) the user should order a Synergy P/N 10001511-1 mounting adapter. This will provide a step-down between the 28mm thread on the antenna and the pipe thread.

If the antenna is being mounted on a smooth 1" OD pipe or conduit the user should order the Synergy P/N 10001511-2 adapter which allows the conduit to slide into the adapter where it is secured by a ¼ inch diameter stainless steel set screw.

Both 10001511 adapters are made from anodized aluminum for excellent performance in environmentally hostile installations.

Synergy Systems, LLC supplies Extension Cables for any length up to 1 kilometer. Bulkhead connectors are also available. When requesting a quote, please indicate whether the cable must be UV tolerant for outdoor use or fire retardant for indoor cable runs.

For Long-term, watertight integrity the interface between the Binder connector at the base of the GSynQ Antenna and that of the connector on the interface cable should be protected with a length of dual-wall shrink tubing. The adhesive on the inside of the tubing will provide a water-tight seal for the connector interface.

Most GSynQ installations require the antenna be co-located with a cellular base station or other high power transmitter. A careful installation will place the GSynQ in an area with minimum RF field strength. This can be accomplished by obtaining the radiation patterns of the transmitting antennas and installing the GSynQ where signal strength is at a minimum. The Antenna is designed to filter out unwanted frequencies, however it is still prudent to install the GSynQ as far away as possible from transmitting antennas. This will minimize the effects of possible harmonics that may be within the pass-band of the M12M and Antenna modules.

Several industry standards exist for lightning protection which is not addressed in this User's guide. However, it is recommended that the GSynQ be installed in an area so that it is not at the highest point, and so that any lightning rods are well above the antenna itself. Although it is not possible for the GSynQ to survive a direct strike, it is possible for the GSynQ to survive the secondary effects of lightning due to the internal 600W transient suppressors on each of the interface wires.

Support

If you have any problems at all, please do not hesitate to contact Synergy's technical support team, either by the phone number on the front of this document, or by email at: OEMTECH@synergy-gps.com